

WHAT IS CLAIMED:

1 1. A bioabsorbable fastener for insertion into pierced openings on opposed sides of a tissue
2 wound comprising:

3 a fastener body formed of a generally bioabsorbable polymer material and
4 defining an initial tissue capture zone internal to the fastener body, the fastener body
5 including:

6 a pair of fastener arms, each fastener arm insertable into one of the pierced
7 openings;

8 a cleat operably joined to each fastener arm at an elbow portion and
9 projecting backward into the initial tissue capture zone with an internal elbow
10 angle defined between the cleat and the fastener arm;

11 a durable tissue retention zone of each fastener arm defined between the
12 cleat and the fastener arm and having an apex at the elbow portion;

13 a maximum insertion width of each fastener arm defined between
14 outermost surfaces of the cleat and the fastener arm; and

15 a backspan operably joined to each fastener arm at a shoulder portion with
16 corresponding internal shoulder angles defined between the backspan and each
17 fastener arm and an internal midspan angle defined between a midpoint of the
18 backspan and the apex of each durable tissue retention zone,

19 wherein the elbow portion and the internal elbow angle of each fastener arm are
20 constructed with the maximum insertion width being greater than a width of the

21 corresponding pierced opening such that at least a portion of the tissue surrounding the
22 pierced opening is stretched over the cleat and elastically retained in the durable tissue
23 retention zone for longer than a minimum degradation period of the bioabsorbable
24 polymer material, and

25 wherein the shoulder portions and the internal shoulder angles are constructed so
26 as to capture wound tissue within the initial tissue capture zone during deployment of the
27 fastener and then dynamically reform in response to lateral stresses applied by the wound
28 tissue after deployment such that a sum of the internal elbow angles and the internal
29 midspan angle remains less than 360 degrees without a fracture failure of the
30 bioabsorbable polymer material until the minimum degradation period of the
31 bioabsorbable polymer material.

1 2. The fastener of claim 1, wherein the initial tissue capture zone is defined by a generally
2 planar cross section defined by a coplanar orientation of a centerline of each of the pair of
3 fastener arms and the backspan.

1 3. The fastener of claim 1, wherein the minimum degradation period of the bioabsorbable
2 polymer material is between five to twenty-one days.

1 4. The fastener of claim 1, wherein the shoulder portions and the internal shoulder angles
2 are constructed so as to generally maintain a shape of the initial tissue capture zone during
3 deployment of the fastener and not dynamically reform in response to lateral stresses applied by

the wound tissue after deployment for an initial period of time less than the minimum degradation period.

5. The fastener of claim 1, wherein the initial period of time is between one to fourteen days.

6. The fastener of claim 1, wherein the internal elbow angles are constructed in a range between 15-70 degrees and the internal shoulder angles are constructed in a range between 70 and 110 degrees.

7. The fastener of claim 1, wherein the internal elbow angles are less than the internal shoulder angles.

8. A dynamic bioabsorbable staple for use with a wound in living tissue having opposed sides, the staple comprising:

a staple body formed of a generally bioabsorbable polymer, the staple body including:

a pair of staple arms each having a distal end and a proximal shoulder portion;

a backspan joining the pair of staple arms proximate the shoulder portions;

8 each shoulder portion being constructed so as to deform without failing in
9 response to lateral forces naturally exerted by the opposed sides of the wound
10 from a first inserted position to a second deformed position; and

11 each staple arm having a cleat defined proximate the distal end of the
12 staple arm that is operably angled toward the backspan and defines a tissue
13 retention zone between the cleat and the staple arm that effectively retains
14 tissue when the staple arm is both in the first inserted position and in the
15 second deformed position.

1 9. The staple of claim 1, wherein the staple arm and the backspan generally define an
2 interior shoulder angle, the interior shoulder angle dynamically transitions from between 70°-
3 100° in the first inserted position to between 120°-180° in the second deformed position.

1 10. A dynamic bioabsorbable staple for use with a wound in living tissue having opposed
2 sides, the staple comprising:

3 a staple body including a pair of staple arms operably joined at a shoulder portion
4 by a backspan, each arm further including an elbow portion having an inwardly
5 projecting cleat, the staple arms, the inwardly projecting cleats and the backspan defining
6 an internal tissue capture zone; and

7 each shoulder portion including an interior shoulder angle generally defined by
8 the backspan and the staple arm, the shoulder portion constructed so that the interior
9 shoulder angle is between 70°-100° in a first position at an insertion time, the interior

10 shoulder angle transitioning to between 120°-180° in a second deformed position at a
11 second time subsequent to the insertion time in response to lateral forces naturally
12 exerted by the opposed sides of the wound.

1 11. The staple of claim 10, wherein each elbow portion includes an interior elbow angle
2 generally defined by the staple arm and the cleat, the elbow portion constructed so that the
3 interior elbow angle is less than 70° in the first inserted position at the insertion time, the interior
4 elbow angle transitioning to a maximum of 90° in the second deformed disposition at the second
5 time.

1 12. The staple of claim 10, wherein the second time is not less than 12 hours subsequent to
2 the insertion time.

1 13. A bioabsorbable, subcutaneous staple comprising:

2 a staple body formed of a generally bioabsorbable polymer, the staple body
3 including:

4 a pair of staple arms each having a distal end and a proximal shoulder
5 portion, the distal end including an inwardly directed cleat, each cleat and arm
6 defining an elbow portion; and

7 a backspan joining the pair of staple arms proximate the shoulder portions,

8 wherein the cleats, arms and backspan cooperatively define a dynamic internal
9 tissue capture zone, the internal capture zone presenting a first shape at an insertion time,

10 the elbow portions and shoulder portions dynamically transitioning in response to lateral
11 forces applied by opposing sides of a tissue wound without failure such that the internal
12 capture zone presents a second shape at a second time subsequent to the insertion time
13 and prior to a minimum degradation period of the bioabsorbable polymer.